USER MANUAL

Version: 17.12.2010 RA00305

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#90915
BL Competition SpecRacing
Dual XPS^{max2} Profiles
SuperBEC 6.0V/3.0A
USB Software Updateability

PEARL SPEC RACING **version 2**

for distributor address see packaging **www.nosram.com**

SPECIFICATIONS

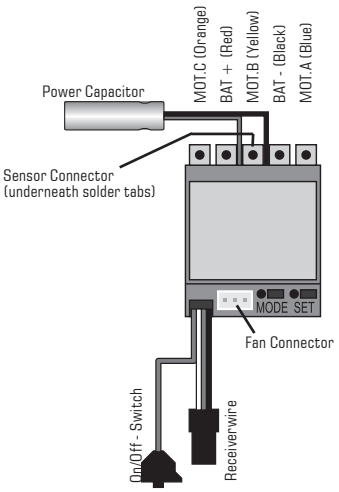
Pure Brushless Competition	yes
Forward/Brake	yes
Footprint	30.5x33.0mm
Height	21.0mm
Weight (excl. wires)	36g
Voltage Input	3.7-7.4V
Typ. Voltage Drop* @20A	0.011V / phase
Rated Current*	400A / phase
Compatible winding styles	Star
Rec. Motor Limit (@7.4V)	>4.5T
Plugged Fan	optional

TwinBEC	6.0V/3.0A
C³ Technology	yes
X-Brake	yes
„Boost 0" Mode	yes
Multi-Protection-System 3	yes
Internal-Temp-Check System 3	yes
Blue LED	yes
Power Wires	3.3mm²
USB Software Updateability	yes
4 adjustable Modes (SCS2, Dual XPS^{MOD}, Autobrake)	yes

* Transistors ratings at 25°C junction temperature

Specifications subject to change without notice.

CONNECTIONS & EXPLANATIONS



RECEIVER CONNECTING WIRE: The Pearl-SR V2 is equipped with a Multicon receiver wire. As supplied, it will easily fit in all ordinary receivers. Make sure you connect it to receiver with correct polarity and use channel 2.

SENSOR CONNECTOR: located underneath the solder tabs. The bi-directional multipole sensor wire connects the speed-control and the motor. Always use the sensor wire and do not alter or modify this cable! There are replaceable/optional hall sensor wires available.
Through this sensor connector, the Pearl-SR V2 can also be updated with the latest software updates available at www.nosram.com using the optional „USB Bridge #92500". Please refer to „USB Software Updateability" for details

POWER WIRES: For maximum performance, flexible silicone power wires without any connectors are used. The unique splitted solder-tabs allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Avoid soldering longer then 5sec per soldering joint to prevent possible damage to the speed-control due to overheating of the components! There are full replacement power wire sets available, please refer to complete line-up at www,nosram.com.

HEATSINK: To achieve best perfomance even under extreme conditions, the heatsink has been directly mounted to the speed-control. This ensures the best possible heat transfer away from the speed-control.
Caution: Never attempt to remove the heatsink or your Pearl-SR V2 may get damaged if you try to do this. The heatsink is an integral part, glued to the fet's and therefore cannot be removed.

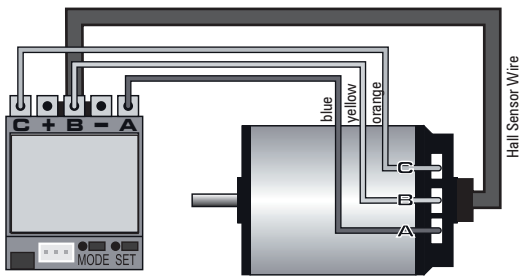
OPTIONAL PLUGGED FAN: for stock racing a fan is not required as the speed-control doesn't become very warm, but if you wish to add the optional fan (#92512) it can be mounted on top of the heatsink and then it get's plugged into the 3-pin connector on the front.

INSTALLATION GUIDE

- Position the speed-control and capacitor where they are protected in the event of a crash and gives you easy access to the connectors and buttons.
- Mount the speedo and capacitor using the supplied thick/black doubled-sided tape
- Make sure there is enough clearance between the speed-control, power-wires, antenna and receiver. Avoid any direct contact between power components, the receiver or the antenna as this can cause interference. If interference occurs, position the components at a different place in the model.
- The aerial should be run vertically up and away from the receiver. Avoid contact with any parts made of carbon fibre or metal. If the aerial is too long, don't coil up the excess length. See also the instructions supplied with your radio control system.

The Pearl-SR V2 comes supplied with flexible 3.3mm² silicone power-wires without connectors. Be very careful with the correct wire sequence/colors since an incorrect connection may damage the speed-control! Avoid creating solder bridges on the solder-tabs and isolate all connections carefully.

- Connect the speed-control to the receiver (position: Channel 2
- Blue power-wire → Speedo MOT.A to motor „A"
- Yellow power-wire → Speedo MOT.B to motor „B"
- Orange power-wire → Speedo MOT.C to motor „C"
- Connect the hall sensor cable to the speed-control (underneath the solder-tabs) and the motor.



- Doublecheck all connections before connecting the speed-control to a battery.
  CAUTION: If battery is connected with reversed polarity it will destroy your speed-control!
- Red power-wire → Speedo BAT+ to battery „Plus"
- Black power-wire → Speedo BAT- to battery „Minus"
- The speed-control is now ready to be set-up

USB SOFTWARE UPDATEABILITY

Through the sensor connector the Pearl-SR V2 can be updated to the latest firmware available for download at www.nosram.com.
The optional „USB Bridge - Speedo Firmware Update + PC-Link" (#92500) and a PC are required to do so, please refer to Nosram website and the manual which comes with the interface for exact details how to do software updates to your speed-control.
The same USB-Bridge can be used to update all the latest Nosram speed-controls (90905, 90955, 90880, etc). Please check guide at ww.nosram.com for further details.

Thank you for your trust in this Nosram product. By purchasing a **Nosram Pearl SpecRacing Version2** (hereinafter refered to as Pearl-SR V2) brushless speed-control, you have chosen one of the most advanced and successful speed-controls of today. This speed-control with all of its high-tech features and specially selected electronic components is one of the best speed-controls currently available on the market. Multiple National Champion 2009/2010!

- Pure Brushless Competition
- **NEW!!!** Dual XPS^{max2} Profiles
- SuperBEC for 1S to 2S LiPo without receiver pack
- Full Contact Cooling Technology
- 3-Way Protection System 3
- USB Software Updateability
- „Boost 0" Mode with disabled timing function
- SmartCell System 2
- Smart-Temp-Readout System 3
- Small footprint

Please read the following instructions carefully before you start using your speed control. This user guide contains important notes for the safety, the use and the maintenance of this product. Thus protecting yourself and avoid damages of the product.
Proceed according to the user guide in order to understand your speed control better. Please take your time as you will have much more joy with your product if you know it exactly.
This user manual shall be kept in a safe place. If another customer is using this product, this manual has to be handed out together with it.

RADIO / SPEEDO SETUP

In setup mode the speed-control stores every step (e.g. learning your radios neutral and endpoints) by pressing the SET button. All the settings will be stored in the memory even if it will be disconnected from the battery.

TRANSMITTER SETTINGS: Setup the following basic functions on your transmitter (if available):

Throttle Travel	High ATV, EPA	100%
Brake Travel	Low ATV, EPA, ATL	100%
Throttle Exponential	EXP, EXPO	start with 0
Neutral Trim	SUB Trim	centre
Servo Reverse	Throttle Reverse	any setting, don't change after set-up procedure!

If your transmitter doesn't offer any of above functions, it's already in „basic setup" mode.

- Ensure that the speed-control is not connected to the drive battery and is switched off.
- Remove motor pinion or ensure that the wheels of the model are free to rotate.
- Switch the transmitter on and set the transmitter throttle stick to neutral.

- Connect the speed-control to the battery and switch the unit on.
- Hold the SET button pressed for at least 3sec.
  → You entered setup mode and the SET LED flashes blue (it will flash until the setup is completed).

- Leave transmitter in neutral position and press the SET button once.
  → Neutral setting is stored , MODE LED flashes yellow and the motor beeps.
- Hold full throttle on transmitter and press the SET button once.
  → Full-throttle setting is stored, MODE LED flashes red.
- Hold full brake on transmitter and press the SET button once.
  → Brake setting is stored, LED's glow red (MODE) and blue (SET).

- This completes the setup procedure and your Pearl-SR V2 is ready to use.
- If you make a mistake during the setup procedure, don't worry: Disconnect the battery for about 10sec and start again from the first step.
- At the start of each run switch on the transmitter first, then switch on the car.
- At the end of each run switch of the car, and then switch off the transmitter.
- For storage of the car, disconnect the drive battery at any time!

Check the LED's when moving the throttle on your radio to doublecheck everything is setup correctly.

Function	Status	Mode LED	Set LED
Neutral	--	off	blue
Neutral (when „Boost Zero" enabled)	--		flashes blue
Forward	partial throttle	yellow	off
	full throttle		blue
Brake	partial brake	red	off
	full throttle		blue

3-WAY PROTECTION SYSTEM

New and improved protection system which also informs you the cause of the shutdown with a special LED flashing sequence. You can indicate that a shutdown occured when blue SET LED flashes very fast and the „error code" (= cause for shutdown) is indicated by the MODE LED's as explained in table below.

Error Code LED flashing sequences:

Error Code	Mode LED's	Set LED	Reason	Possible Cause
#1	Yellow	Blue (fast flashing)	Speed-Control Thermal Shutdown	1. too high settings for XPS Dual^{MOD} power-profiles? 2. too high gear ratio? 3. too low motor wind for application? 4. too high mechanical motor timing?
#2	Red		Motor Thermal Shutdown	
#3	Yellow/Red (alternate)		Battery Low Voltage Cut-Off	1. battery empty or wrong setting in SCS2? 2. battery damaged? 3. motor too strong for battery discharge capability? 4. poor connection (bad connector, bad soldering joint)?
#4	Yellow/Red (same time)		Motor Failure	1. sensor wire missing or defective? 2. drivetrain stuck? 3. motor defective (locked rotor, damaged sensor)?

Active power reduction at critical temperatures: The cut-off function for both motor- and speed-control temperature is now an active type, in case you're getting near critical temperatures the speed-control will automatically switch to „Boost0" mode during operation. A critical temperature is considered as equal to 9 flashes!
This function allows you to finish your run or at least reach the pitlane during running, at reduced speed, as otherweise you would not finish your run!
The blue LED will flash, in case the 9 flashes where reached during the run (to indicate it switched to „Boost0 mode"), but this mode will of course not be stored in the memory but your choosen profiles will be active for next run (after switching off/on) again.

You should not exceed 8 flashes during normal use for both motor- and speed-control temperature, please adjust your XPS$^{max.2}$ profiles and motor accordingly, so you stay within these safe limits. The final thermal cut-off will occur at 10 flashes, as explained further down.

At your own risk: if you wish to disable motor temperature cut-off completely you can do so by using value 0 in Mode.1. We call this function „Hardcore Racing Mode". as it also disables the cell-voltage cut-off completely.
Important: The speed-controls thermal cut-off can not be disabled!

Smart-Temp-Readout System 3: allows you to read-out the maximum internal temperature that the speedo and motor have reached during the run. You can conviencently read-out the temperature back in the pits since it remains stored until you turn it on the next time regularly (which will reset the memory). This feature allows you to accurately check if all is running well or if you're close to shutdown already.

How to read-out the temperature:
→ switch at „OFF" position.
→ keep MODE button pressed while you turn switch to „ON" (then release button).
→ at first speed-control temperature will be indicated.
→ SET LED will start to flash blue (MODE LED's are off) ....
→ count the number of flashes.The higher the number, the hotter the speedo ran (shutdown occurs at 10 flashes).
→ to change to motor temperature read-out, press MODE button one more time.
→ SET LED will start to flash blue (MODE LED's are off) again, for motor the LED's on time will be shorter.
→ count the number of flashes.The higher the number, the hotter the motor ran (shutdown occurs at 10 flashes).
→ every flash below 10 equals to 5°C temperature decrease.

Temperature chart (speed-control and motor temperature):

#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
> -45°C > -81°F	-40°C -72°F	-35°C -63°F	-30°C -54°F	-25°C -45°F	-20°C -36°F	-15°C -27°F	-10°C -18°F	-5°C -9°F	Shut-down

Caution: motor temperature read-out only works if motor has a built-in NTC temperature sensor!

MODE PROGRAMMING

The Pearl-SR V2 features 4 modes which enable you to adjust it 100% to YOUR special requirements. The factory settings are shown in grey colour.

- How to get into „programming the modes" ➔ Press MODE button for 3 or more seconds.
- How to check the stored values ➔ Count the number of flashes of the blue SET-LED (* = value 1 | ** = value 2 | etc.).
- How to change the value ➔ Press SET button to increase value by one step.
- How to get to the next Mode ➔ Press MODE button once.
- How to leave the programming mode ➔ If you are in MODE.4, press the MODE button one more time, which will also store the settings!

Important: do not turn the switch off before leaving Mode 4 (by one more press of MODE button) as otherwise your recent changes won't be stored in the memory of the Pearl-SR V2!

Table of settings, values and modes: see below (grey-shaded values show „works default settings")

Mode.1 (SCS2): allows you to adjust the cut-off voltage precisely depending on the battery type you use:

LED flashes	Remark	#0	#1	#2	#3
Yellow	Cut-Off Voltage	disabled	3.2V	4.4V	6.4V
	use for		1S LiPo	2S LiFePo	2S LiPo

Caution: WorksDefault setting is 2S LiPo, so if you use other batteries you need to adjust Mode.1 before first use!

Using value #0 in this mode will also disable the motor temperature cut-off function! Please refer to section „Multi Protection System 3" for further details.

Mode.2 („Torque/Feel"):

LED flashes	Remark	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Red	Torque Timing %	0%	40%	50%	60%	70%	80%	0%				
	Initial Drive Level	1	2			3	4	2	3	4	5	6
	use for motors	ALL	X12 motors					all other motors				

Mode.3 („RPM/Boost"):

LED flashes	Remark	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12
Yellow/Red (alternate)	Boost Timing %	0%	50%		60%		70%		80%		90%		100%	
	RPM Ramp	--	slow	fast	slow	fast	slow	fast	slow	fast	slow	fast	slow	fast

Mode.4 (Automatic Brake): allows you to set a slight braking action when your trigger is in neutral range.

LED flashes		#0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Yellow/Red (same time)		dis-abled	Going from lowest to highest automatic brake setting (value 1 = minimum / value 10 = maximum)									

BOOST ZERO MODE

If value #0 is choosen for Mode.2 AND Mode.3 (e.g. factory default!) the blue LED will flash in neutral trigger position to indicate that entire timing advancement is disabled for „true stock racing" as required by certain federations!

SMART-CELL SYSTEM 2 & SUPER-BEC

SmartCell System 2: ensures that all batteries can be used safely for all applications, please select the correct value according to our table under „Mode Programming". When the battery voltage reaches the selected cut-off voltage, the motor function will be disabled and the LED's will indicate that the shutdown has occured due to undervoltage of your batteries (see right side „Multi Protection System 3" for further details).

Caution: WorksDefault setting is 2S LiPo, so if you use other batteries you need to adjust Mode.1 before first use!

SuperBEC: a true BEC revolution! Constant 6V/3A output with input voltage from 3.0 to 7.4V, no need for a receiver battery or booster circuit even with 1S LiPo due to the integrated buck/boost technology!

There is no point in using a receiver pack in any class of racing with Pearl-SR V2. there is no benefit when using one!

If you still want to use a receiver pack, connect it to the receiver directly and leave the speed-controls switch in OFF position. Make sure the receiver packs voltage is within your receivers & servo's limitations (the speed-control itself can accept up to 7.4V from receiver pack),.

TROUBLESHOOTING GUIDE

To eliminate all other possibilities or improper handling, first check all other components in your model and the trouble shooting guide before you send in this product for repair. If products are sent in for repair, which do operate perfectly, we have to charge a service fee according to our pricelist.
Always check error by checking LED error code first, this gives you a good indication were to search!

SYMPTOM	CAUSE	REMEDY
Motor overheats	False settings on Mode's 2 and/or 3	Adjust settings of Mode's 2 + 3
	Too high mechanical motor timing	Decrease mechanical motor timing
	Too little motor cooling	Add cooling fan and/or heatsink
Insufficient performance. E.g. poor power, topspeed or brake	Wrong Gear ratio	Adjust gear ratio
	False settings on Dual XPS^{MAX2}	Adjust settings under Dual XPS^{MAX2}
	Transmitter settings changed after set-up	Repeat set-up procedure
	Power Capacitor damaged	Replace Power Capacitor
	Motor or sensor-board in motor defective	Replace sensor-board or motor
	Speed-control defective	Send in product for repair
Servo is working, no motor function	Speedo plugged in incorrectly	Plug speedo to receiver as Ch.2
	3-way protection System activated	Check settings for your application
	Wiring problem	Check wires and connectors
	Sensor wire missing/defective	Install/replace sensor wire
	Motor defective	Replace motor
	Speedo defective	Send in product for repair
No servo and no motor function	Speedo connected to receiver with wrong polarity	Connect speedo with correct polarity
	Wiring problem	Check wires and connectors
	Battery defective	Replace with different battery pack
	Crystal, receiver or transmitter defective	Replace components one by one
	Speedo defective	Send in product for repair
Motor stutters while accelerating	Sensor wire defective	Replace sensor wire
	Motor or sensor board in motor defective	Replace sensor board or motor
	Radio interference	Change location of components
	Power capacitor damaged	Replace power capacitor
	Speedo defective	Send in product for repair
Motor runs in reverse when accelerating forward on radio	Model with reversed gearbox!	Can not use a sensored brushless system!
Speed-control switches off frequently	Wrong setting in SCS2 (Mode.1)!	Change value of SCS2 (Mode.1) accordingly
	Model used too often without cool-down periods	Let cool down after every run
	Motor stronger than motorlimit or input voltage too high	Use only motors and batteries which are within the specifications of the speed-control
	Stuck drivetrain or ball-bearing	Maintain model
	Motor defective	Replace motor
Motor never stops, runs at constant slow speed	Transmitter settings changed after set-up	Repeat set-up procedure
	Humidity/water in speedo	Immediately unplug and dry speedo
	Motor or sensor board in motor defective	Replace sensor board or motor
Radio interference	Receiver or antenna too close to power wires, motor, battery or speedo. Receiver aerial too short or coiled up	See „Installation Tips" and „Installation"
	Receiver defective, too sensitive; Transmitter defective, transmitter output power too low, servo problem	Replace components one by one Only use original manufacturers crystals
	Poor battery connection	Check plugs and connecting wires
	Transmitter batteries empty	Replace / recharge transmitter batteries

The crossed-out wheeled bin means that within the European Union the product must be taken to seperate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.

DUAL XPS^{MAX2} PROFILES

Allows you to adjust the Pearl-SR V2 characteristics to different motor types, classes and personal likes! These two mode's combine Nosram's completely revised active motor timing system, where the software calculates the best commutation & timing for „Torque/Feel" and „Boost/RPM".

Please take your time to understand the two modes and their functions, otherwise you will not fully benefit from the latest achievements built into this speed-control.
Be aware that Mode.2+3 are something entirely new and not the same as the settings we had on Version1 speedo, so do not try to „transfer" your knowledge from old speedo to new Pearl-SR V2!

Mode.2 („Torque/Feel"): there are two separate groups, which you need to choose from, based on motor type:

Group A (1 - 5) ➔ for use with Nosram Pure & Cobra and LRP X12 & K4 motors.
➔ choose correct value as suggested below. Higher value doesn't mean more torque or power, this setting needs match your motor, motor-timing, class and preference!
➔ generally, choose lower values (1-2) for fast motors (10.5T) and higher settings (3-5) for slower motors (17.5T).

Group B (6 - 10) ➔ for use with all other motors (such as Nosram Storm, LRP X11, Novak, Tekin, SP, Orion, Epic, GM, Corally, etc)
➔ these profiles vary by different initial drive levels, which alter the feeling for the motor. Higher profiles for „Group B" result in more aggressive throttle response.

Team advise: when using „Group A"motors and a too high value for Mode.2, the power may fade before the end of your run! If this happens you need to decrease to a lower setting until power stays consistent throughout run.

Mode.3 („RPM/Boost"): adjusts the boost timing %, which is applied to the motor based on it's RPM.

There is a total of 12 profiles (see chart on left side with details and numbers):
➔ 6 of them are different boost-timing steps (from 50% to 100%)
➔ each of these % is also available with two different RPM-ramps (fast + slow).

Always start with the slow rpm-ramp profiles (odd numbers) first and find the desired boost timing % for your motor before trying the fast profiles (even numbers). Certain motors will not like the slow or the fast ramps, which may result in strange feeling and unlinear power release.

Choosing a too high value in mode.3 increases the motor temperature excessively, make sure you find the best performance by increasing step by step very carefully and monitor motor temperature!
Important: all 12 values are designed for stock motors, if you want to run modified motors you should select #0!

General gearing advise: correct gearing is crucial for good performance, generally the Pearl-SR V2 produces a large amount of torque, therefore it can be geared quite high (large pinion) compared to other speed-controls. If geared too low you can not obtain maximum available power in regards of torque & speed.

Recommendations by the team: based on our extensive testing, we recommend the following gearing and profile range for different motors and classes. Please take this as a starting point and finetune it from there, our recommendations are based for average/medium-size tracks.

Motor Type	Turns	Class	Ratio	MODE.2	MODE.3
Nosram Pure Nosram Cobra LRP X12 LRP K4	10.5	Touring Car	7.5:1	1 2	1 3
		1/12th 1S	48mm	2 3	4 5 6
		Off-Road	tba	1 2	1 3
	13.5	Touring Car	6.0:1	2 3	3 4 5
		1/12th 1S	55mm	3 4	4 6 8
		Off-Road	tba	1 2 3	1 3 5
	17.5	Touring Car	5.0:1	3 4 5	3 4 5 6
		1/12th 1S	tba	4 5	6 8
		Off-Road	tba	2 3 4	3 5
All other motors (such as Nosram Storm, LRP X11, Novak, Tekin, SP, Orion, Epic, GM, Corally, etc)	10.5	Touring Car	tba	6 7	6 7 8 9
		1/12th 1S	tba	7 8	7 8 9 10
		Off-Road	tba	6 7	3 5 7 9
	13.5	Touring Car	6.0:1	6 7	7 8 9 10
		1/12th 1S	65mm	8 9	8 9 10
		Off-Road	tba	6 7	5 7
	17.5	Touring Car	5.0:1	8 9	8 9 10 11
		1/12th 1S	tba	9 10	9 10 11 12
		Off-Road	tba	7 8	5 7 9

SPECIAL FEATURES

Lower Motor Temperatures: our engineers succeeded to further improve the commutation algorithm, which results in much lower motor operating temperatures then when other speed-controls are used. Our own extensive testing has shown up to 20°C lower motor temperatures, with same power then before!

All New Brake Design: a good starting point for the brake setting on your radio is 80% for all classes. Make sure you do the radio-setup with all settings on the radio on 100%!

Changing Mode settings without the transmitter: At race events you usually do not have access to your transmitter, but never mind since you can simply disconnect the receiver lead from the receiver and change the MODE settings as described at „Mode Programming".

Works-Default-Settings: All Nosram speed-controls come factory-adjusted (defaults are grey-shaded above). If you loose track of the modes, you can restore the works default settings. With the transmitter switched on, hold the SET button pressed while you switch on the speed-control. This returns the unit to the works default settings.

Power Capacitor: Never run without a power-capacitor! It offers increased punch and additional protection, it must be connected to BAT+ and BAT- solderpads with shortest possible wires.

Full Contact Cooling: another first, achieved by NOSRAM! The revolutionary Full Contact Cooling Technology for lowest running temperatures, a special copper core bonds the bottom side fets to the heatsink for even cooling of all fet's which results in higher power towards the end of the run and a lower motorlimit.

REPAIR PROCEDURES / LIMITED WARRANTY

All products from NOSRAM are manufactured according to the highest quality standards. NOSRAM guarantees this product to be free from defects in materials or workmanship for 90 days (non-european countris only) from the original date of purchase verified by sales receipt. This limited warranty doesn't cover defects, which are a result of misuse, improper maintenance, outside interference or mechanical damage.

„This applies among other things on:
- Cut off original power plug or not using reverse polarity protected plugs
- Receiver wire and/or switch wire damaged
- Mechanical damage of the case
- Humidity/Water inside the speed control
- Mechanical damage of electronical components/PCB
- Soldered on the PCB (except on solderpads)
- Connected speed-control with reversed polarity"

To eliminate all other possibilities or improper handling, first check all other components in your model and the trouble shooting guide, if available, before you send in this product for repair. If products are sent in for repair, which do operate perfectly, we have to charge a service fee according to our pricelist.

With sending in this product, the customer has to advise NOSRAM if the product should be repaired in either case. If there is neither a warranty nor guarantee claim, the inspection of the product and the repairs, if necessary, in either case will be charged with a fee at the customers expense according to our price list. A proof of purchase including date of purchase needs to be included. Otherwise, no warranty can be granted. For quick repair- and return service, add your address and detailed description of the malfunction.

If NOSRAM no longer manufactures a returned defective product and we are unable to service it, we shall provide you with a product that has at least the same value from one of the successor series.
The specifications like weight, size and others should be seen as guide values. Due to ongoing technical improvements, which are done in the interest of the product, NOSRAM does not take any responsibility for the accuracy of these specs.

NOSRAM-Distributor-Service:

- Package your product carefully and include sales receipt and detailed description of malfunction.
- Send parcel to your national NOSRAM distributor.
- Distributor repairs or exchanges the product.
- Shipment back to you usually by COD (cash on delivery), but this is subject to your national NOSRAM distributor's general policy.